

## Influence of Pre-Soaking Treatment on Seedling Growth of Khirni (*Manilkara hexandra* Roxb) Seedling cv. Local

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Received: 15.1.2018 | Revised: 22.02.2018 | Accepted: 26.02.2018

### ABSTRACT

The experiment was conducted at the Lal-baugh farm, Fruit research station, Department of Horticulture, Junagadh Agricultural University, Junagadh (Gujarat) during 2016. The experiment was laid out in Complete Randomized Design (CRD) with three repetitions and twelve pre-soaking treatments. Considering the effect of GA<sub>3</sub> 200 mg/l, was found most effective for the maximum plant height (12.08 cm) other observation like growth number of leaves (12.02), number of branches (3.43), leaf area (25.28 cm<sup>2</sup>), stem diameter (2.05 mm) at 180 DAS and in case of fresh weight of stem (1.96 g) at 180 DAS and dry weight of stem (0.98 g) at 180 DAS and total dry weight (1.44 g).

**Key words:** Khirni seed, Cow dung slurry, Gibberellic acid, KNO<sub>3</sub>, Thiourea.

### INTRODUCTION

The botanical name of Khirni is *Manilkara hexandra* (Roxb) Dubard, and it belongs to the family Sapotaceae or Mahua-family (Plant family Sapotaceae consists of trees/shrubs with milky latex. It includes about 70 genera and 800 species. The characteristic feature of member of this family is presence of reddish brown hairs on the leaf undersides and other plant surfaces). The synonyms of specie is *Mimusops hexandra* Roxb.

The Khirni (*Manilkara hexandra* Roxb) is native of Central India and the Deccan peninsula. It is cultivated in greater part of India for ornamental and wild sown near villages, common in wastelands' and hedges, in plains, gregarious in patches in

Saurashtra for its sweet edible fruits. Khirnis commonly grown in laterite soil. Wastelands can be utilized by growing Khirni.

Khirni or Rayan is a small to medium sized evergreen tree, with a spreading crown and straight massive bole. Bark is dark grey and deeply furrowed. The leaves are alternate, stiff, glabrous, shining dark green in colour and leathery. The leaves at the tip are usually roundish and narrowing towards the petiole. The flowers solitary white or pale yellow. Fruit ellipsoid 1.5 - 2.0 cm long. Seed 1 or rarely 2, reddish brown and shining. Khirni is propagated commercially through seeds. Seeds are extracted from fresh fruit and sown in rainy season for raising the seedlings.

**Cite this article:** Bajaniya, V.G., Karetha, K.M., Parmar, L.S., Purohit, V.L. and Chotaliya, B. M., Influence of Pre-Soaking Treatment on Seedling Growth of Khirni (*Manilkara Hexandra* Roxb) Seedling cv. Local, *Int. J. Pure App. Biosci.* 6(1): 1668-1672 (2018). doi: <http://dx.doi.org/10.18782/2320-7051.6329>

Studies on seed viability further revealed that, Khirni seeds have tendency to lose viability quickly<sup>2</sup>. When compared to fresh seed, stored for one, three and six months showed, loss in germination to the extent of 12, 31 and 36%, respectively. Seed priming using GA<sub>3</sub> 1000 ppm for 24 hrs. Restored germination significantly about 0, 17 and 23%. The uniform emergence and early vigour obtained due to priming, could be commercially exploited to obtain graftable size of seedling early, so nursery costs can be reduced<sup>3</sup>. Besides seed propagation is the cheapest and easiest method.

Khirni is used as a rootstock for sapota in India. One of the best of these fruits, is also one of the least known. The golden yellow berries Khirni or rayan that come for only a very short time in the month of May, just when the real heat of summer starts. The problem of poor germination of seeds, limited availability of rootstock plants, slow rate of growth of Khirni seedlings to attain the graftable size for approach method of grafting, which is commonly used, take longer time for the graft success. Use of plant growth regulators, in enhancing seed germination and seedling growth of numerous plant species is well known<sup>18,12</sup>. In addition synthetic chemicals, other naturally available bio-products or organics are known to contain vital plant growth substances, which enhance the growth and development of plant<sup>1</sup>.

Plant growth regulators and some chemicals are widely used in increasing the seed germination percentage and for vigorous and healthy growth of seedlings. GA<sub>3</sub>, KNO<sub>3</sub>, and Thiourea are being used on a large scale for increasing seed germination, stimulating the growth of various parts of plants and enhancing the rate of elongation of young seedlings. For enhancing, the seed germination and growth of seedling we can use PGR's like GA<sub>3</sub>, Ethrel, chemicals like KNO<sub>3</sub>, Thiourea, and cow dung slurry.

#### MATERIAL AND METHODS

The present experiment was carried out at the Lal-baugh farm, Fruit research station,

Department of Horticulture, Junagadh Agricultural University, Junagadh (Gujarat) during the year 2016. The climate of South-Saurashtra region, where Junagadh Agricultural University, Junagadh is situated, is typically sub-tropical, characterized by fairly hot and dry summer. The monsoons are warm and moderately humid and winters are cold and dry. Junagadh is situated at 21°5' N latitude and 70°5' E longitudes with the altitude of 60 meters above mean sea level on the western side, at the foot hills of the mount 'Girnar'. Climate is typically subtropical, characterized by fairly cool and dry winter, hot and dry summer and warm and moderately humid monsoon. The rainy season commences by third week of June and ends in September. July and August are the months of heavy precipitation. Average rainfall of this area is 848.4 mm. Partial failure of monsoon once in three to four years is common in this region. Winter sets in the month of November and continues till the month of February. December and January are the coldest months of winter. Summer commence in the second fortnight of February and ends in the middle of June. April and May are the hottest months.

The experiment was laid out in Complete Randomized Design (CRD) with three repetitions. In all, there were twelve pre-sowing treatments, control (T<sub>1</sub>), water soaking (T<sub>2</sub>), Cow-dung Slurry (T<sub>3</sub>), GA<sub>3</sub> 150 mg/l (T<sub>4</sub>), GA<sub>3</sub> 200 mg/l (T<sub>5</sub>), GA<sub>3</sub> 250 mg/l (T<sub>6</sub>), KNO<sub>3</sub> 0.5 % (T<sub>7</sub>), KNO<sub>3</sub> 1.0 % (T<sub>8</sub>), KNO<sub>3</sub> 1.5 % (T<sub>9</sub>), Thiourea 0.5 % (T<sub>10</sub>), Thiourea 1.0 % (T<sub>11</sub>), Thiourea 1.5 % (T<sub>12</sub>).

#### RESULTS AND DISCUSSION

The healthy and robust vegetative growth is an essential prerequisite for better establishment in the field and production. Growth attributes like viz., plant height, number of leaves per plant, number of branch per plant, leaf area (cm<sup>2</sup>), stem diameter, fresh weight of stem and dry weight of stem, as well as total dry weight (root + stem) were the important parameters to access the vigour of the coconut seedling. Results obtained for seedling growth affected under various pre-sowing treatments.

**Plant height (cm):**

Data presented (Table-1) shows, significant difference in plant height 6.84, 8.47 and 12.08 cm recorded under GA<sub>3</sub> 200 mg/l, as compared to rest of the treatments at 90, 135 & 120 days respectively. The treatment T<sub>5</sub> found at par with T<sub>4</sub>. The plant height was increased due to the higher seedling length and higher root growth. GA<sub>3</sub> induced the cell elongation process, and ultimately increased the height of the seedling and root length. This findings are in agreement with the result obtained by Misra *et al*<sup>10</sup> in citrus, in khirni<sup>14,19</sup>, in kagzi lime<sup>8</sup> and papaya<sup>15</sup>.

**Number of leaves per plant:**

It is evident from the data (Table-1) that, maximum number of leaves was recorded 11.02 with the treatment T<sub>5</sub> GA<sub>3</sub> 200mg/l at 180 DAS. Which found at par with T<sub>4</sub>, over the T<sub>1</sub> (control). Increase in number of leaves might be due to higher growth of seedlings. This also helped in invigoration of physiological process of plant and stimulatory effect of Thiourea to form new leaves at faster rate, as suggested by Sharma *et al*<sup>16</sup>. Such findings also reported by Chaudhary *et al*<sup>4</sup> in Rangpur lime, in citrus<sup>10</sup>, in papaya<sup>15</sup>, in khirni<sup>14</sup>, in kagzi lime<sup>8</sup>, in mango<sup>11</sup> and in Khirni<sup>19</sup>.

**Number of branches per plant:**

Data presented in (Table-1) indicates significant difference in number of branches 3.43, recorded under treatment T<sub>5</sub> GA<sub>3</sub> 200 mg/l, found at par with T<sub>4</sub>, as compared to rest of the treatments at 180 days. GA<sub>3</sub> induced the cell elongation process and ultimately increased the growth of the plant. As increase the growth of the plant the accumulation of photosynthesis, which help in development of the plant and increased the branch numbers per plant. This finding is in agreement with the result obtained by<sup>5</sup> in Balanitesaegyptiaca.

**Leaf Area (cm<sup>2</sup>):**

It is evident from the data (Table-1) that, treatment T<sub>5</sub> recorded maximum leaf area 25.28 at 180 days and found at par with T<sub>4</sub>. Increase in leaf area might be due to increase in leaf length and leaf width, which ultimately increased in leaf area of the plant. GA<sub>3</sub> is

growth hormone, which also help in invigoration of physiological process of plant and stimulatory effect to growth at faster rate, as suggested by Sharma *et al*<sup>16</sup>. Such type of finding also reported by Chaudhary *et al*<sup>4</sup> in Rangpur lime, in citrus<sup>10</sup>, in Khirni<sup>13</sup>, in kagzi lime<sup>8</sup> and in Khirni<sup>19</sup>.

**Stem diameter (mm):**

Data presented in (Table-1) shows significant difference in stem diameter 2.05 mm was recorded under GA<sub>3</sub> 200 mg/l and found at par with T<sub>4</sub>, as compared to rest of the treatments at 180 days. To the fact that, GA<sub>3</sub> increased osmotic uptake of nutrients, causing cell elongation and thus increased height of the plant and stem diameter also increased due to greater cell division and elongation at the stem portion by Sen *et al*<sup>15</sup>. This finding is in agreement with the result, obtained in Aonla<sup>6,9</sup>.

**Fresh weight of stem (g):**

Data presented (Table-1) indicates significant differences on fresh weight of stem at 180 DAS. It is clear from the results that, the treatment T<sub>5</sub> *i.e.* GA<sub>3</sub> 200 mg/l, registered the maximum fresh weight of stem 1.96 g at 180 days, followed by T<sub>4</sub>. The increase in fresh weight of root with GA<sub>3</sub> application, seems to have resulted in mobilizing the water and nutrient transport at higher rate. This might be the primary cause of stem elongation. This result is confirmation with the findings in Rangpur lime<sup>4</sup>, in Khirni<sup>13</sup> and in Passion fruit<sup>7</sup>.

**Dry weight of stem (g):**

It is clear from the results (Table-1) that significantly the maximum dry weight of stem 0.98 g, was recorded under the treatment GA<sub>3</sub> 200 mg/l, followed by the treatment T<sub>4</sub>. The dry weight increased due to the higher accumulation of fresh weight in seedlings. As quick initial germination increased the fresh weight of seedling due to more seedlings height, simultaneously increased dry weight. This findings are in agreement with the result obtained by Chaudhary *et al*<sup>4</sup> in Rangpur lime, in Mosambi<sup>17</sup>, in Khirni<sup>13</sup> and in Passion fruit<sup>7</sup>.

**Total dry weight (g):**

It is clear from the results (Table-1) that significantly the maximum total dry weight

1.44 g, was recorded under the treatment GA<sub>3</sub> 200 mg/l, followed by the treatment T<sub>4</sub>. The dry weight increased due to the higher accumulation of fresh weight in seedlings. As quick initial germination increased the fresh

weight of seedling due to more seedlings height, simultaneously increased dry weight. This finding are in agreement with the result obtained by Chaudhary *et al*<sup>4</sup> in Rangpur lime, in Mosambi<sup>17</sup> and in Khirni<sup>13</sup>.

**Table 1: Influence of pre-soaking treatment on seedling growth of Khirni seedling cv. Local**

Treatments	Plant height (cm)	Number of leaves per plant	Number of branches per plant	Leaf area per plant (cm <sup>2</sup> )	Stem diameter (mm)	Fresh weight of stem (g)	Dry weight of stem (g)	Total dry weight (g)
T <sub>1</sub>	8.76	8.13	1.13	11.50	1.33	0.56	0.33	0.50
T <sub>2</sub>	9.79	8.52	1.33	14.49	1.53	0.60	0.35	0.54
T <sub>3</sub>	11.12	10.60	2.83	23.44	1.89	1.24	0.71	1.10
T <sub>4</sub>	11.93	11.91	3.30	25.06	1.99	1.93	0.96	1.41
T <sub>5</sub>	12.08	12.02	3.43	25.28	2.05	1.96	0.98	1.44
T <sub>6</sub>	11.24	11.22	3.23	23.53	1.94	1.70	0.91	1.32
T <sub>7</sub>	10.16	9.65	2.33	22.80	1.69	0.99	0.53	0.87
T <sub>8</sub>	10.32	9.70	2.47	22.86	1.72	1.02	0.58	0.94
T <sub>9</sub>	10.04	9.62	2.30	22.77	1.68	0.94	0.50	0.80
T <sub>10</sub>	10.36	9.95	2.60	23.10	1.71	1.07	0.59	0.96
T <sub>11</sub>	10.75	10.09	2.73	23.18	1.76	1.11	0.62	1.01
T <sub>12</sub>	10.26	9.69	2.57	23.08	1.70	1.04	0.54	0.87
S.Em. ±	0.29	0.26	0.06	0.59	0.04	0.02	0.01	0.01
CD at 5%	0.84	0.75	0.19	1.72	0.11	0.07	0.03	0.04
C.V. %	4.69	4.38	4.43	4.69	3.57	3.6	2.85	2.41

### CONCLUSION

It can be concluded from the result obtained from the experiment that, seed treatment with Gibberellic acid 200 mg/l, to Khirni seed (24 hrs soaking) was found most effective for plant height, number of leaves, number of branches, leaf area, stem diameter, fresh weight of stem, dry weight of stem and total dry weight.

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